

# New Laser Use Standards

## AFOSR and the development of the LASER

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electromagnetic waves.

In 1951, Dr. Townes conceived the idea of the maser, and a few months later he and his associates began working on a device using ammonia gas as the active medium. In early 1954, the first amplification and generation of electromagnetic waves by stimulated emission were obtained. Dr. Townes and his students coined the word "maser" for this device, which is an acronym for Microwave Amplification by Stimulated Emission of Radiation.

Critics, who didn't appreciate or understand the significance of the development at the time, dubbed the maser as Means of Acquiring Support for Expensive Research. The maser, in addition to paving the way for the development of the laser, enhanced communication. Because of its sensitivity, it is still used today in atomic clocks.

In collaboration with Dr. Art Schawlow, who shared his interest in microwave spectroscopy, Townes began work on a theory that could enable operations at wavelengths a thousand times shorter than the maser. They first published the principles in 1958 in the Physical Review. Work continued on the laser, which was later patented by others in 1960.

In 1964, Townes, along with A. Prokhorov and N. Basov of the Lebedev Institute in Moscow, shared the Nobel Prize in Physics for "fundamental work in the field of quantum electronics which has led to the construction of oscillators and amplifiers based on the maser-laser principle." In 1981, Schawlow was awarded the Nobel Prize for physics for his contribution to the development of the laser.



Uniformed Services University of Health Sciences professor Maj. Pat Roach and postdoctoral Fellow Tome Johnson conduct research on the effects of laser light on the human eye. Their research, along with the efforts of Dr. Benjamin Rockwell at Brooks AFB, Texas led to a new national standard on laser light exposure.